Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (currently amended) An isolated complex comprising:

a heme binding protein complexed with a porphyrin, wherein said complex reversibly binds oxygen with a low affinity and wherein said protein comprises

(i) a heme binding domain that has at least 20% identity to SEQ ID NO: 76, comprises proline at a position corresponding to residue 37 of SEQ ID NO: 76, phenylalanine at a position corresponding to residue 43 of SEQ ID NO: 76, and histidine at a position corresponding to residue 93 of SEQ ID NO: 76, and associates with the porphyrin; and

(ii) an aerotaxis signaling domain that has at least 30% identity to SEQ ID NO: 79.

2-5 (canceled)

6. (previously presented) The complex according to claim 1, wherein the protein has an amino acid sequence of SEQ ID NO:2.

7-10 (canceled)

11. (previously presented) A blood substitute comprising a complex according to claim 1.

12-15 (canceled)

16. (previously presented) The blood substitute according to claim 11, wherein the protein has an amino acid sequence of SEQ ID NO:2.

17-47 (canceled)

48. (currently amended) A chimeric protein comprising:

a heme-binding domain of an isolated heme binding bacterial protein, wherein the heme-binding domain has at least 20% identity to SEQ ID NO: 76, and comprises proline at a position corresponding to residue 37 of SEQ ID NO: 76, phenylalanine at a position corresponding to residue 43 of SEQ ID NO: 76, and histidine a position corresponding to residue 93 of SEQ ID NO: 76; and

a heterologous signaling domain.

49. (previously presented) The chimeric protein according to claim 48, wherein the heterologous signaling domain is a mutated signaling domain having altered affinity for its ligand.

50 (canceled)

51. (previously presented) The chimeric protein according to claim 48, wherein the heme binding domain is from a heme binding protein isolated from *Archaea*.

52. (previously presented) The chimeric protein according to claim 51, wherein the heme binding protein is isolated from *Halobacterium salinarium*.

53. (previously presented) The chimeric protein according to claim 52, wherein the activity of the heme binding protein is salt tolerant.

54. (previously presented) The chimeric protein according to claim 52, wherein the heme binding domain comprises the amino acid sequence of SEQ ID NO: 77.

55-65 (canceled)

66. (previously presented) The complex according to claim 1 wherein the complex is purified.

67. (previously presented) The complex according to claim 1 wherein the complex is recombinant.

68. (previously presented) The complex according to claim 1, wherein the heme binding domain comprises a plurality of α-helices.

69. (previously presented) The complex according to claim 68, wherein the heme binding domain comprises eight α-helices.

70. (previously presented) The complex according to claim 1, wherein the heme binding domain is positioned N-terminal and the aerotaxis signaling domain is positioned C-terminal in the heme binding protein.

71. (currently amended) The complex according to claim 1, wherein the heme binding domain is greater than 30% ~~at least 20%~~ identical to SEQ ID NO: 76.

72 (canceled)

73. (previously presented) The complex according to claim 1, wherein said protein is about 50 kDa.

74. (previously presented) The complex according to claim 1, wherein the porphyrin is a Fe-porphyrin.

75. (previously presented) The complex according to claim 74, wherein the Fe-porphyrin is a heme molecule.

76. (previously presented) The complex according to claim 75, wherein the heme molecule is a b-type heme molecule.

77. (previously presented) The complex according to claim 75, wherein the complex has an oxygenated form characterized as having spectral properties of: Soret band absorption at 406 nm, α-band absorption at 578 nm, and β-band absorption at 538 nm.

78. (previously presented) The complex according to claim 75, wherein the complex has a deoxygenated form characterized as having spectral properties of: Soret band absorption at 425 nm, and converged α-band and β- band absorption centered at 555 nm.

79. (previously presented) The complex according to claim 1, wherein the porphyrin is a Zn-porphyrin.

80. (previously presented) The complex according to claim 1, wherein the porphyrin is a Sn-porphyrin.

81. (previously presented) The blood substitute according to claim 11, wherein the porphyrin is a Fe-porphyrin.

82. (previously presented) The blood substitute according to claim 81, wherein the Fe-porphyrin is a heme molecule.